

CLAIMS

We claim:

1. A method of maintaining milk production in a dairy cow fed a low phosphorus diet, comprising the steps of:

feeding a feed that contains about 0.3% by weight or less of an inorganic phosphorus supplement to a dairy cow; and

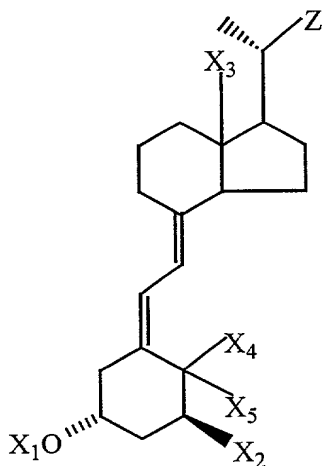
5 feeding with said feed an effective amount of a 1α -hydroxylated vitamin D compound for increasing phosphorus uptake in the cow's gut.

2. The method of claim 1 wherein said 1α -hydroxylated vitamin D compound is fed as a top dressing on said feed.

3. The method of claim 1 wherein said effective amount of the 1α -hydroxylated vitamin D compound comprises about $0.1\mu\text{g/kg}$ to about $100\mu\text{g/kg}$ of diet.

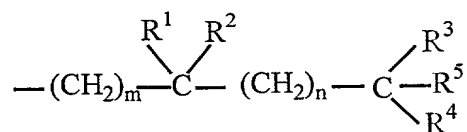
4. The method of claim 1 wherein the feed contains 0% by weight of an inorganic phosphorus supplement.

5. The method of claim 1 wherein said 1α -hydroxylated vitamin D compound is characterized by the following general structure:



5 where X₁ may be hydrogen or a hydroxy-protecting group, X₂ may be hydroxy, or protected hydroxy, X₃ may be hydrogen or methyl, X₄ and X₅ each represent

- hydrogen or taken together X_4 and X_5 represent a methylene group, and where Z is selected from Y , $-OY$, $-CH_2OY$, $-C\equiv CY$ and $-CH=CHY$, where the double bond may have the cis or trans stereochemical configuration, and where Y is selected
- 10 from hydrogen, methyl, $-CR_3O$ and a radical of the structure:



- where m and n , independently, represent integers from 0 to 5, where R^1 is selected from hydrogen, hydroxy, protected-hydroxy, fluoro, trifluoromethyl, and C_{1-5} -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or
- 15 protected-hydroxy substituent, and where each of R^2 , R^3 and R^4 , independently, is selected from hydrogen, fluoro, trifluoromethyl and C_{1-5} alkyl, which may be straight-chain or branched, and optionally bear a hydroxy or protected-hydroxy substituent, and where R^1 and R^2 , taken together, represent an oxo group, or an alkylidene group, $=CR_2R_3$, or the group $-(CH_2)_p-$, where p is an integer from 2 to 5,
- 20 and where R^3 and R^4 , taken together, represent an oxo group, or the group $-(CH_2)_q-$, where q is an integer from 2 to 5, and where R^5 represents hydrogen, hydroxy, protected-hydroxy, or C_{1-5} alkyl.

6. The method of claim 1 wherein the vitamin D compound is 1α -hydroxyvitamin D_3 .

7. The method of claim 1 wherein the vitamin D compound is $1\alpha,25$ -dihydroxyvitamin D_3 .